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Designing Conducive Residential Outdoor Environment for Community: Klang Valley, Malaysia

Siti Norjihan Jamaludin*, Nik Hanita Nik Mohamad, Sharifah Khalizah Syed
Othman Thani

*Department of Landscape Architecture,
Faculty of Architecture, Planning and Surveying, UiTM Shah Alam, 40000 Selangor Darul Ehsan, Malaysia*

Abstract

Residential developments have long term impacts on the communities, and the surrounding of the neighbourhood. The regional and local legislated policy and guidelines for sustainable development have been put in place such as Local Agenda 21, National Landscape Policy and Greater KL/KV green initiatives. However, it is still a new trend for housing development in Malaysia. This study aims to investigate the extent sustainable landscape design approach has been implemented in residential development in Klang Valley. It is hoped to guide landscape architecture practitioners, policy makers and urban designer to incorporate sustainable landscape design approach for a conducive living environment.

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Keywords: Sustainable development; outdoor living; residential community; green neighbourhood

1. Introduction

Residential is the place where human community live, work and play. It is the best place to educate young people to be aware and responsible in taking care of the Mother Nature and understanding the

*Corresponding author. Tel.: 0176537962

E-mail address: ctnorjihan@yahoo.com

environment that we live in. The placement, design, built form and how well it knit into the fabric of existing or new communities are factors which can, in a very real way, colour the lives of people on a daily basis, and for future generations. Implementation of sustainable landscape approach to provide good living environment will benefit the communities. The issues and problems of implementing sustainable landscape practice is being one of the crucial aspects that need to be addressed in Malaysia. The professional bodies and developers have to take actions and be responsive to implement sustainability concept which can help to conserve the environment. This will improve the quality of life and social protection as what the government has urged. According to Nazirah (2009), at present, only large developers are starting to incorporate sustainable landscape practices in their projects. Eco-friendly development and energy-efficient systems has already been implemented since 2005 and the current trend is in the most high-end developments. However, it is still unpopular yet with medium-cost development (Jenny, 2011). Many developers are still unwilling and uncertain to pursue sustainability in their projects due to limited understanding and the concern about cost incurred. Farahwaheeda (2010) observed that most of developers are still ignoring the need to include parks in their projects and were only fulfil the minimum guidelines. The current practice usually requires 10% allocation for provision of green area in every development. However, the consideration to substantially increase landscape design to 50-80% should be encouraged in the future project development towards developing a sustainable outdoor living environment. This paper aims to outline sustainable landscape design principles and investigate the extent of sustainable landscape approach that has been implemented in residential development at Klang Valley. The objectives are to identify important elements of sustainable landscape approach and to provide recommendations and strategies on the best sustainable residential landscape design for landscape practices.

2. Literature review

2.1. The needs for sustainable residential landscape

Nowadays, people are more aware of the benefits of sustainability. They need green space such as parks in achieving comfort and quality of life. The existence of parks has contributed to the protection of biodiversity and ecological environment such as drought reduction, flood, wind, and temperature control. In addition, parks enhance aesthetic value; provide benefits in education and in the study of nature. It also provides the residents the opportunity for social contact and creates sense of place (Sportza, 2006). People are no longer merely buying a house; they are also buying and investing in an environment. Crompton (2001) concludes that close vicinity of residential property to parks will provide positive effects on property values. The ultimate goal of planning and designing a sustainable residential environment is to provide a healthy setting for the residents. Poor housing conditions could adversely affect the resident's life and would deteriorate the physical, mental and social aspects, and the quality of life of the occupants. Therefore, it is significant to improve the quality of residential environment as a part of pursuing a better quality of people's living (Heui Cho, 2010).

2.2. Landscape interventions

There are many developments considering and integrating sustainable principles into residential subdivisions. In Australia, the Urban Land Development Authority (ULDA) has received Enviro Development accreditation through the Urban Development Institute of Australia's (UDIA). This accreditation assesses a project against six elements including ecosystems, water, energy, waste, community and materials. The environmental principles and practices have been incorporated into the

development with minimal impact to cost and time. These outcomes were achieved by integrating appropriate design principles and methodologies early in the planning stages and working closely with the builders. In Seoul, South Korea, ChonGae Canal Point Source Park is an ASLA (American Society of Landscape Architects) Honor Award Recipient. The canal restoration project completed in 2005 is restoring seven miles of Seoul's historic waterways. It provides residents with clean drinking water, crop irrigation, and a means of transportation. This new park creating a vibrant public space reunites with adjacent neighbourhoods and reconnects the people of Seoul to the historic waterway. In Arvada, Colorado, United State of America (USA), Geos Net Zero Energy Neighbourhood awarded the ASLA Honor award. The project is part of the city's comprehensive plan to reduce sprawl and intense development by establishing the north-south transit corridor. Geos generates 100 percent of its renewable energy from geothermal wells and photovoltaic solar panels. Optimal density and building arrangement provides energy savings by maximizing passive solar heat and natural day lighting, which lowers energy consumption. It is also feature 8.5 acres (34 percent of site) of parks and open space including fruit tree, community gardens, play areas, percolation parks, town squares, event spaces, and mixed-use meadows. Lily Lake Residence in Dalton, Pennsylvania that once an agriculture land is converted to a sustainable residential area by restoring the natural grades of the land and improving the irrigation system. The rainwater is collected into the pond that located at the southern part of the new estate. The pond prevents flooding and reintroduces an aquatic ecosystem that had long been destroyed.

2.3. Sustainable landscape design principles

Creating a sustainable landscape means the designers need to consider aspects in order to create a pleasant place that is part of an environmental solution rather than an environmental problem. Development process from beginning until results gained should be maintained and sustained. Many study and researches have been conducted; to gain information and alternatives to create a sustainable landscape. These have been proven by many universities with the goal to provide sustainable landscape information to the public and to the landscape industry. Sustainable Urban Landscape Information Series (SULIS) 2006 established by the University of Minnesota have provides a concepts of sustainable outdoor spaces through and landscape design. It identifies five (5) considerations in designing a sustainable landscape as shown in Figure 1.

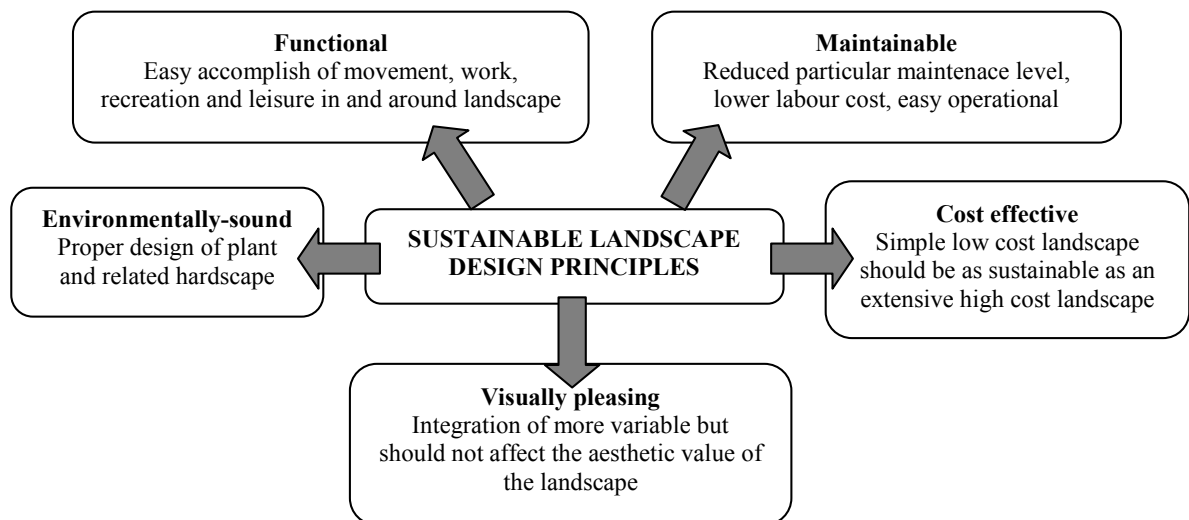


Fig. 1. Five considerations in sustainable landscape design principles

A review on literature indicates that there are various approaches to achieve sustainable landscape design. Thompson and Sorvig (2008) listed ten important principles to making an environmentally responsive landscape design by adapting a sustainable attitude towards landscape design. These principles are as follows:

- Keep sites healthy – protection of tree, topsoil, and prevent erosion. Use correct equipment and utilities.
- Heal injured sites – bioremediation, debris removal and recycling, restore damaged soil, and appropriate plants.
- Flexible materials –living erosion control, green walls, green roofs, construct for and with plants, limit turf and choose resilient plants.
- Respect the waters of life – work with the hydrology. Restore wetlands, rivers and streams. Collect and conserve water, irrigate intelligently, reuse gray water and clean water at every opportunity.
- Pave less – plan and design to reduce paving, use techniques to reduce runoff, use permeable paving and cool paving with judicious planting.
- Use native and origin materials – let re-use be re-inspiration, use local and recycled materials, use sustainably harvestable renewable, avoid toxic and non-renewable material.
- Reduce costs of energy over time – manage energy with machines, tools and labor, embodied energy and live-cycle costing.
- Effective lighting –low-voltage and LED revolution.
- Reduce noise pollution –noise absorbing barriers and quieter landscape tools.
- Maintain and sustain –costs of conventional maintenance, appropriate machinery and tools, bio-based products, consider alternatives to mowing and adapt using native plants.

The Sustainable Sites Initiatives, an interdisciplinary partnership of the ASLA, the Lady Bird Johnson Wildflower Centre, and the United States Botanic Garden has also spent several years developing guidelines for sustainable land practices. Their principles of a sustainable site are:

- Do not harm – protect the site from changes that will degrade the surrounding environment. Promote projects with low disturbance and opportunity to regenerate ecosystem services through sustainable design.
- Precautionary principle – avoid decisions that risk to human, environmental health and any actions that can cause irreversible damage. Examine alternatives that open to contributions from all affected parties.
- Design with nature and culture – create and implement designs that are responsive to economic, environmental, and cultural conditions with respect to the local, regional, and global context.
- Prevention, conservation, and regeneration – preserve existing environmental feature and ecosystem services.
- Provide regenerative systems as intergenerational equity – provide future generations with sustainable environment supported.
- Support a living process – continuously re-evaluate assumptions and values and adapt to demographic and environmental change.
- Use thinking approach system – understand the value of relationships in an ecosystem and use an approach that reflects and sustains ecosystem services; re-establish the integral and essential relationship between natural processes and human activity.
- Use an ethical approach – encourage direct and open communication among colleagues, clients, manufacturers, and users to link long-term sustainability with ethical responsibility.

- Maintain integrity in leadership and research – implement transparent and participatory leadership, develop research with technical rigor, and communicate new findings in a clear, consistent, and timely manner.
- Foster environmental stewardship - In all aspects of land development and management, foster an ethic of environmental stewardship—an understanding that responsible management of healthy ecosystems improves the quality of life for present and future generations.

2.4. Role of landscape architects

Sustainable landscape has become one of the most demanding and important tasks for both scientist and built environment practitioners. According to Xiangqiang (2009), landscape architecture is capable to play a vital role to accomplish the task. As a multi-disciplinary field in built environment industry, landscape architecture is not just merely dealing with plantings but it incorporates wide range of disciplines including knowledge in architecture, ecology, environmental sciences, geology and art (Dzarul Hardy, 2005).

At present, practitioners and professionals involved in the built environment recognize the environmental impacts due to the ignorance on natural ecosystems. According to Calkin (2004), main challenges to implement the ecological strategies in landscape development were high cost consumption, lack of information, testing and data on performance of strategies, time available for research, and resistance by project stakeholders and other related parties.

Towards designing a conducive outdoor residential environment, landscape architects should play an important role by designing and implementing projects that respect both the needs of people and protect the environment. Professionals who can meet human needs by making wise use of our environmental resources are in demand today and will continue to be so in the future. As cities increasingly become the primary habitat for humans, our landscapes will be ever more designed (Wu 2008). Thus, proper designing, planning, and management of urban landscapes will increasing global sustainability.

The Declaration on Environment and Development (1992) inspire landscape architects to contribute towards a sustainable development. One of the principles is to incorporate sustainable design principles to protect the environment and ecological function in the development process.

2.5. Governmental initiatives

To encourage the conducive outdoor living environment and improve the residents' quality of life, the government has introduced the Green Neighbourhood Planning Guideline to integrate sustainable landscape principles via urban planning system. Urban and Rural Planning Department is responsible to ensure that the guideline will be applied by local authorities nationwide. The guideline serve as a tool to drive planning and the formation of green urban neighbourhoods in Malaysia, including carbon reduction assessed by 'low carbon cities framework' by the Ministry of Energy, Green Technology and Water.

3. Research methodology

This study involves site observation for sustainable landscape design practices in residential area and review of literature to outline sustainable landscape design strategies. The case studies were selected based on their relevance to the research purpose. All residential area were selected based on successful awards it received and also based on the characteristic of the design that have been applied and its potential to be as a role model to other new projects.

3.1. Case studies

3.1.1. Bukit Gita Bayu, Seri Kembangan

Bukit Gita Bayu is located in Serdang, Seri Kembangan (Figure 2). The area is about 118 acres and it is a gated residential community with mixed residential development. It was developed by Yee Seng Heights Sdn Bhd and built on a secondary forest that has re-established over a rubber plantation. It has received a Federation on International Real Estate (FIABCI) award for the Best Residential Development in year of 2003 and Best Landscaping for Hotel/Resort/Tourism Complex Category (2003).



Fig. 2. Location map of Bukit Gita Bayu
Source: Google Earth (2013)

Bukit Gita Bayu is characterised by the natural topography which is undulating landform and terrain stretching from the hill of Kelton Estate. The terrain was enclosed by natural trees which comprises of Brazilian rubber trees (*Hevea brasiliensis*) that have been conserve (Figure 3). The residence is landscaped with lush greenery to provide tropical resort living experience (Figure 4). The building architecture and other structures were inspired by a village concept. It has been planned and designed to retain the natural elements as much as possible and the selection of materials is by maximising the use of natural and local materials to assimilate with the surrounding. The road pattern has been constructed to be parallel to the contours. The uniqueness of this green neighbourhood is because of its promising tranquillity and natural environment since there are not many eco-friendly developments in the country.

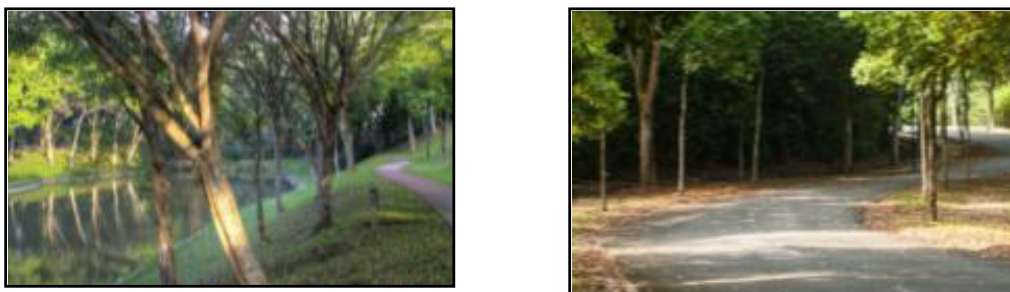


Fig. 3. Natural trees in Bukit Gita Bayu

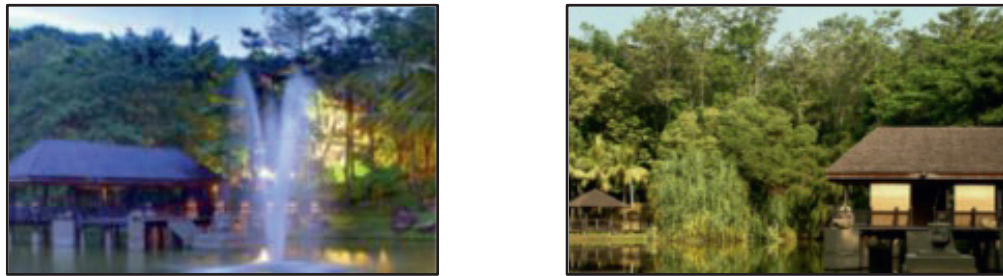


Fig. 4. Lush greenery landscape of Bukit Gita Bayu residence gives a tropical resort experience

3.1.2. Setia Eco Park, Shah Alam

The other project is Setia Eco Park that located in Shah Alam, Selangor. Spread across 791 acres of prime freehold land in Shah Alam, Eco Park is renowned for its scenic landscape tapestry that pays tribute to the beauty of Mother Nature. This is the perfect friendly environment for people to live in with the both private and close to nature. This residential development is a fully gated and guarded community. It consists of semi-detached homes and bungalows. There also is a centralized neighbourhood shopping village and a clubhouse. It is an exclusive estate as there are only 3.7 units on average per acre, which makes it one of the largest exclusive enclaves with the lowest population density in the entire Klang Valley. Developed by SP Setia Group, the development has been built with the environmentally-responsive elements in mind. Thus, it has been proven by winning the World's Best Master Plan Development award by the FIABCI Prix d'Excellence Award in 2007. 25% of the land area has been allocated for the creation of waterways, lakes, creeks, landscape themed parks, lush walkways, and forest park for the enjoyment and to enhance outdoor living environment of its residents. Specially coined names appropriately describe the landscaping features such as Symphony of Wind, Rainbow Creek, Paddy Terrace, Eco Gateway and the Theatre of Dreams that form the various nooks and corners in this sprawling fairy-like garden of delight (Setia Eco Park, 2013). Figure 5 shows the landscape design features that incorporate ecological elements in Setia Eco Park.



Fig . 5. Landscape design features that incorporates ecological elements in Setia Eco Park residence
Source: Setia Eco Park website (2013)

PRINCIPLES OF SUSTAINABLE LANDSCAPE DESIGN

Sustainable Sites and Management

- Conserve and protect natural site including tree protection (conserve matured/heritage/eco- significant vegetation),
 - maintain natural form of topography. (preserve ecologically productive land)
 - Sufficient Green Open Spaces to counter the urban heat effect.
 - Storm water management to prevent localized flooding.
 - Pollution control.
-

2. Energy Efficiency

- Use renewable energy such as solar.
 - Use of fluorescent lights or natural skylights
 - Transportation
-

3. Water Efficiency

- Rainwater Harvesting
 - Water re-cycling
 - Water efficient landscaping – sprinkler system
 - Conserve water system (ponds and lakes) as aquatic wildlife habitat.
-

4. Materials – Hardscape and Softscape.






- a) Hardscape
 - Materials selection and re-use.
 - Regional Materials
 - Environmentally Friend Materials
 - b) Softscape
 - Maximizing native and naturalistic vegetation
 - Promote ecosystem for animal – bird species
 - Use low maintenance softscape.
-





4. Results and discussions









Table 1 shows the selected principles on landscape design approach that were synthesize from extensive literature reviews. There are approaches or principles that can be as used a guidance for practitioners in designing sustainable landscape that suitable on Malaysia climate, condition and scenario. Through site observation, it can be seen that both residential developments of Bukit Gita Bayu and Setia Eco Park have been incorporated the principles of sustainable landscape design. From the master plan of Bukit Gita Bayu and Setia Eco Park, it can be seen that there are sufficient amount of green space and landscape design being integrated into the residential layout. The used and utilization of natural and local








elements in both residence serves as an ecological function to foster the equilibrium for the neighbourhood ecosystem. The good practices of preservation and conservation that have been implemented by maintaining the natural form, topography and local trees could also benefits the community. The man-made ponds and lakes served a retention pond and storm water management mechanism. Besides, it could also helps in promoting an ecosystem for animal by providing an aquatic wildlife habitat.



4.1. Summary of findings

Principles/Approaches	Case Study 1	Case Study 2
<p>1) Sustainable Sites and Management</p> <p>a) Maintain natural form of topography (Preserve ecologically productive land).</p> <p>b) Preserve existing tree and protect natural site including tree protection (preserve matured/heritage/eco-significant vegetation).</p> <p>c) Provide sufficient green open spaces to counter the urban heat effects.</p>	<p><u>Bukit Gita Bayu, Seri Kembangan</u></p> <p>a) Maintain the general nature topography form of the site which is rubber plantation and undulating form.</p>  <p>b) 50% of the area preserves rubber trees, tree maturity 30-50 years.</p> <p>c) Lake as a recreation area and as a retention pond.</p> 	<p><u>Setia Eco Park, Shah Alam</u></p> <p>a) Maintain the general nature topography form of the site which is Oil palm plantation, valley landform. Preserve waterway.</p>  <p>b) 20% of the area, transplanting for oil palm trees.</p>  <p>c) Create Lake and pond to be as a retention pond. Also to as a part of recreation area.</p> 

<p>d) Plan storm water management to prevent localized flooding.</p>		
<p>2) Energy Efficiency</p> <p>a) Use renewable energy such as wind, solar and/or geothermal power.</p> <p>b) Use the fluorescent/LED lights.</p> <p>c) Plan ensure a compact, easily walkable residential area and safety also make walking and cycling more attractive than using the car.</p>	<p>b) Most of the area.</p> <p>c)</p> 	<p>a) Most of the area. – Solar lighting.</p>  <p>c)</p> 

	  
<p>3) Water Efficiency</p> <p>a) Provide rainwater harvesting and water recycling system.</p> <p>b) Create ponds and lakes/manmade wetland as aquatic wildlife habitat and as a retention pond.</p>	<p>a) To collect rainwater and to reuse for watering plants and other purposes.</p>  <p>- Collect water from drain to the retention pond and it picks up pollutants before entering natural water bodies.</p>    

		
<p>4) Materials</p> <p>a) Hard Landscape</p> <ul style="list-style-type: none"> - Reuse and recycle materials (construction materials) - Local Materials to support local economies and reducing energy consumption and transportation costs. 	<p>a) Reuse boulders and slab. Use loose pebble to minimize water runoff.</p>   	<p>a) Reuse boulders to create steps. Wood material for benches and dustbin. Interlocking paver and <u>grasscrete</u> to reduce water runoff.</p>   

<p>b) Soft Landscape</p> <ul style="list-style-type: none"> - Maximizing native and naturalistic vegetation. - Promote ecosystem for animal (bird species) - Low maintenance, reduce pruning, spraying and fertilizing. With disease and insect resistance. 	<p>b) Planting selection - forest trees such as Khaya trees, <i>Hopea odorata</i> and also rubber trees.</p> 	<p>b) Planting selection - Aquatic plants, Butterfly plants, Salad bowl community garden, Fragrance type and Fruit garden.</p> 
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5. Conclusion

This study indicates that to successfully design the conducive residential outdoor environment, the most significant part is to facilitate the professionals and design practitioners with the knowledge and understanding on sustainable landscape design elements. Designing and creating the sustainable culture in residential area is not simple but not impossible. Planning and designing for sustainable future should consider measures on current needs and changes in technology in order to accomplish the sustainable landscape principles. It is hoped that this paper provides useful information for practitioners especially landscape architect on sustainable landscape design approach to provide an environmentally-responsive residence. In conclusion, this research explores the sustainable landscape design approaches and principles in designing residential area to become more conducive and livable. The incorporation of sustainable landscape design approach in residential development will not only provide the conducive and livable living environment, but also contributes to improve the aesthetical and property value. In addition, the incorporation of sustainable landscape design principles were also contribute to protect biodiversity and ecological elements. This will help to prevent flood, drought reduction, wind and temperature control, and promote outdoor thermal comfort to the residential community. Hence, this provides the residential community with the social contact, sense of place and favorable living environment.

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References

- American Society of Landscape Architects (2011). Sustainable Residential Design: Increasing Energy Efficiency. ASLA Professional Practice.
- Ministry of Energy, Green Technology and Water, KETTHA, (2011). Guideline On Green Neighbourhood Planning Launched.
- Farahwaheeda (2010). The Impact of Park on Residential Property Values, Case Study : Bukit Jelutong Residential Area.
- Heui Cho (2010). Indoor Environment Quality related on Residential Satisfaction in Old Multi-Family Housing. SHB2010 - 3rd International Symposium on Sustainable Healthy Buildings; Seoul, Korea.
- American Society of Landscape Architects (2009). The Case for Sustainable Landscapes. The Sustainable Sites Initiative.
- Nazirah (2009). Sustainable Construction in Malaysia–Developers’ Awareness.
- Xiangqiang. (2009). Sustainable landscape architecture: implications of the Chinese philosophy of “unity of man with nature” and beyond.
- Carl Smith and Andy Clayden (2008). Residential Landscape Sustainability, a Checklist Tool. Balckwell Publishing.
- William Thompson and Kim Sorvig (2008). Sustainable Landscape Construction: A Guide to Green Building Outdoors. Island Press Publisher.
- Nik Mohamad, Nik Hanita and Mohammad, Siti Zabeda (2007) Ecological considerations in the planning process of residential landscape / Nik Hanita Nik Mohamad and Siti Zabeda Mohammad. Build Environment Journal, 4 (2). pp. 61-68. ISSN 1675-5022
- Sportza, L. M. (2006). From parks to protected area. A case study of Totonto. Doctor of Philosophy, University of Waterloo, Ontario, Canada.
- Dzarul Hardy Azwar, (2005). Landskap – Kerjaya Profesional Masa Kini.
- Crompton, J. L. (2001). The impact of parks on property value. Parks and Recreation.
- Department of Town and Country Planning Peninsular Malaysia, JPBD (2012). Green Neighbourhood Planning Guidelines.